

Specification
AC/AC Power Converter and Substrate

Field of the Invention

[0001] The present invention relates to a power module for AC/AC power conversion. More particularly, the present invention relates to a power module for converting an AC voltage to a desired AC voltage using a converter and an inverter.

Background Information

[0002] For long years, a power module with two switches or a power module with four switches was a device only which has been used excessively within the power conversion field. Main reasons for standardizing those power modules are for simplicity and for universal application. Such type of power modules are commercially supplied under various names such as an integrated gate bipolar transistor module "IGBT MOD", an intelligent module "ASIPM" for specific application, and a dual inline package intelligent power module "DIP-IPM". All the above example are developed to improve only conditions of load-side application. But, grid-side was always ignored because of lack of the reason for severe competition.

[0003] In recent years, EMC regulation and worldwide market economy have changed their conditions very rapidly. And, a new type of power module has introduced in the market.

[0004] First, a matrix module was introduced from Olaf Simon, et al, "Modern Solution for Industrial Matrix-Converter Applications", IEEE Transactions on Industrial Electronics pp/401-406, V61.49, No.2, April 2002 and Patrick W. Wheeler, et al, "Matrix converter: A Technology Review", IEEE Transactions on Industrial Electronics pp/276-288, V61.49, No.2, April 2002. As is illustrated in Fig. 1, this module intends AC-AC conversion in three phase.

[0005] Second, an active-filter intelligent power module "A/F IPM" was proposed from G Mjumdar, et al, "Intelligent power module applications", IEEJ Technical Report No.842, pp. 13-19, Jun 2001. As is illustrated in Fig. 2, "A/F IPM" intends power factor correction on grid-side for single phase application. In the active filter power module of Fig. 2, 100 designates a noise filter, 101 designates a diode bridge, 102 designates an IGBT, 103 designates a load, 104 designates a multiplier, 105 designates an Input current negative feedback circuit, 106 designates over temperature protection, 107 designates a short